

AMENDMENTS TO THE DRAWINGS

With reference to the attached replacement sheets, the drawings have been amended as follows:

Sheet 2, FIG. 2: reference numeral 256 has been deleted.

Sheet 5, FIG. 5: reference numeral 500 has been deleted.

Sheet 8, FIG. 8: reference numerals 814 and 818 in bottom portion of figure have been changes to 914 and 918.

REMARKS

Claims 1-8, 15-17, 21, 23, 25, 26, 29-32 are currently pending in this application. Claims 9-14, 18-20, 22, 24, 27 and 28 have been canceled. Claims 1, 2, 7, 15, 16, 21, 23 and 25 have been amended. New claims 29-32 have been added. No new matter has been added by these amendments or additions. Applicants have carefully reviewed the Office Action and respectfully request reconsideration of the claims in view of the remarks presented below.

Election/Restrictions

Claims 1-9, 15-18, 21 and 23-26 were identified as being drawn to determining a respiratory characteristic from A-V conduction intervals, while claims 10-14, 19, 20, 22, 27 and 28 were identified as being drawn to another invention. Based on a telephonic provisional election, claims 10-14, 19, 20, 22, 27 and 28 were withdrawn from further consideration as being drawn to a non-elected invention. Applicants affirm their provisional invention election and accordingly, have canceled claims 10-14, 19, 20, 22, 27 and 28.

Drawing Objections

The drawings were objected to for including reference characters not mentioned in the description, specifically, 256 in figure 2 and 500 in figure 5. As indicated in the "Amendments to the Drawings" section, figures 2 and 5 have been corrected.

Claim Objections

Claim 9 was objected to as being in improper dependent for failing to further limit the subject matter of the previous claim. Claim 9 has been canceled.

Claim Rejections Under 35 U.S.C. §102

Claims 1, 4, 5, 15, 17, 21, 23 and 26 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,712,555 (Thornander).

Amended independent claims 1 and 23 relate to systems and methods that deliver a plurality of pacing pulses to an atrium; determine a plurality of atrioventricular conduction interval times based on the plurality of pacing pulses; and compare the intervals over a period of time to detect an interval pattern indicative of either normal respiration or abnormal respiration.

Amended independent claims 15 and 21 relate to apparatuses and methods that determine atrioventricular conduction interval times over a period of time; and compare the intervals to detect an interval pattern indicative of either normal respiration or abnormal respiration.

Thornander discloses a pacemaker that adjusts its pacing rate in response to cardiac interval measurements. Thornander theorizes that changes in a person's physiological needs, e.g. a need for an increase in oxygenated blood flow, produce corresponding changes in cardiac intervals. See column 1, lines 56-57 and column 9, lines 1-18. Accordingly, in order to comply with physiological needs, cardiac intervals are measured and compared to a reference interval measurement to determine if the interval is increasing or decreasing, and the pacing rate is increased or decreased in order to meet those needs. See FIG. 12A. The interval measurements in Thornander are not compared in anyway to detect an interval pattern indicative of either normal respiration or abnormal respiration.

In view of the foregoing, Applicant submits that Thornander fails to disclose the combinations of elements and features recited in independent claims 1, 15, 21 and 23, including at least, the comparison of AV intervals to detect an interval pattern indicative of either normal respiration or abnormal respiration. Accordingly, Applicants request reconsideration of the §102 rejections of these claims and their respective dependent claims 4, 5, 17 and 26.

Claims 15, 16, 21, 23 and 26 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,919,210 (Lurie).

As stated above, independent claims 15 and 21 relate to apparatuses and methods that determine atrioventricular conduction interval times over a period of time; and compare the intervals to detect an interval pattern indicative of either normal respiration or abnormal respiration. Independent claim 23 relate to a system that delivers a plurality of pacing pulses to an atrium; determines a plurality of atrioventricular conduction interval times based on the plurality of pacing pulses; and compares the intervals over a period of time to detect an interval pattern indicative of either normal respiration or abnormal respiration.

Lurie discloses a devise that detects syncope based on sensing of physiologic activity. Exemplary physiological activities include AV conduction times and respiration rate. The only methods ore devices disclosed in Lurie for determining respiration rate involve chest wall impedance. See column 2, lines 23-24. Thus, Lurie does not disclose determining atrioventricular conduction interval times; and comparing the intervals to detect an interval pattern indicative of either normal respiration or abnormal respiration.

In view of the foregoing, Applicants submit that Lurie fails to disclose the combinations of elements and features recited in independent claims 15, 21 and 23. Accordingly, Applicants request reconsideration of these §102 rejections of claims 15, 21 and 23 and dependent claim 26.

Claim 16 have been rewritten in independent form and relate to methods that determine a respiratory cycle length based on atrioventricular conduction interval times.

As stated above, Lurie discloses determining respiration rate based on chest wall impedance. Thus, Lurie does not disclose determining a respiratory cycle length based on atrioventricular conduction interval times. Accordingly, Applicants request reconsideration of the §102 rejection of claim 16.

Claim Rejections Under 35 U.S.C. §103

Claims 2, 6, 16, 18 and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over Thornander in view of U.S. Patent No. 6,641,542 (Cho).

Claims 6, 18 and 24 have been canceled.

Claims 2 and 16 have been rewritten in independent form and relate to methods that determine a respiratory cycle length based on atrioventricular conduction interval times. As admitted in the Office Action, Thornander does not disclose determining a respiratory cycle length. Cho is cited as teaching a pacemaker that uses average respiration cycle length for detecting sleep apnea.

Cho discloses a device that determines cycle length and frequency of Cheyne-Stokes respiration based upon physiological data. See abstract. This physiological data is provided by a sensor device that may comprise an impedance sensor, a body movement sensor, an oxygen level sensor and a blood pressure sensor. See column 6, line 52 through column 8, line 37. It is significant to note that Cho does not disclose determining a respiratory cycle length based on atrioventricular conduction interval times.

In view of the diverse teachings of Thornander, *i.e.*, adjusting pacing rate in response to physiological demand, and Cho, *i.e.*, Cheyne-Stokes respiration cycle length and frequency based on non-cardiac event sensors, Applicants submit that one of ordinary skill in the art would not have been motivated to combine the references as suggested in the Office Action. Regarding the motivation cited in the Office Action, Applicants find it inadequate and simply disagree that the requisite motivation is provided by Cho. Furthermore, even if the Thornander and Cho were combined as suggested in the Office, Applicants' claimed invention would not have been obtained. More specifically, neither Thornander nor Cho teach or suggest determining a respiratory cycle length based on atrioventricular conduction interval times. Thus, without more, combining Thornander and Cho would have simply yielded a physiological-demand, rate-responsive pacemaker with an additional sensor that

detects respiration cycle based on impedance, body movement, oxygen level or blood pressure.

Once Applicants have taught their innovative method for determining a respiratory cycle based on atrioventricular conduction interval times, such method may, by hindsight, seem to be obvious to one having ordinary skill in the art. However, when viewed as of the time Applicants' invention was made, and without the benefit of Applicants' own disclosure, there is nothing in the art of record which realistically suggests Applicants' inventive approach.

In view of the foregoing, Applicants submit that neither Thornander nor Cho, either alone or in combination, teach or suggest the combination of elements and features recited in independent claims 2 and 16. Accordingly, Applicants request reconsideration of the §103 rejections of these claims.

Claims 18 and 24 were also rejected under 35 U.S.C. §103(a) as being unpatentable over Lurie in view of Cho. As stated above, claims 18 and 24 have been canceled.

Claim 3 was rejected under 35 U.S.C. §103(a) as being unpatentable over Thornander in view of Applicant's purported admitted prior. In view of the foregoing analysis of independent claim 1 in view of Thornander, Applicants believe that the rejection of claim 3 under §103 is moot as it depends from allowable independent claim 1.

Allowable Subject Matter

Claims 7-9 and 25 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims. Claims 7 and 25 have been rewritten in independent form. Claim 8 depends from claim 7; claim 9 has been canceled. Claims 7, 8 and 25 are believed to be in condition for allowance.

New Claims 29-32

New claim 29-31 recite further features of independent claim 1. New claim 32 recites further features of independent claim 15. Applicants submit that the prior art of record does not disclose the features of these claims.

CONCLUSION

Applicants have made an earnest and bona fide effort to clarify the issues before the Examiner and to place this case in condition for allowance. Therefore, allowance of Applicants' claims 1-8, 15-17, 21, 23, 25, 26, 29-32 is believed to be in order.

Respectfully submitted,

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Date



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